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ABSTRACT

Developed by the publications committee of the Industrial Arts Division of the American Vocational Association, this document describes innovative industrial arts programs that are currently under operation and show promise for future development or improvement. The programs summarized in this bulletin were selected by the committee for inclusion because they appeared to be operating successfully under certain conditions in the various educational levels of: (1) Elementary and Secondary Education, (2) Special Education, and (3) College and In-Service Education. A full listing of program titles, the schools, agencies or areas involved, and the persons reporting is given. (GR)

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innovative programs in industrial arts

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Foreword

The one characteristic of the future about which we are most certain is *change;* it is also the one factor about which we, as a profession, have evidenced the least willingness and/or competence to deal with adequately. There are, however, promising signs on the horizon at the elementary, secondary, and teacher education levels where innovative teachers and administrators are wrestling with this factor of change in order to meet better the objectives of industrial arts and provide a more meaningful program for today's youth and adults.

Recognizing the need to publicize the efforts of those successfully meeting the challenge of change in industrial arts, the Publications Committee of the Industrial Arts Division of AVA, with approval of the chairman of the Industrial Arts Policy and Planning Committee, appointed a Committee on Innovative Programs in Industrial Arts. The function of this committee was to study and report the activities and programs currently under operation that were innovative in nature and promising for future program development and/or improvement.

The committee members appointed were: Walter C. Brown, Arizona State University, Tempe, Arizona, Chairman; William A. Baranyai, Detroit Public Schools, Detroit, Michigan; Lowell L. Carver, Iowa State University, Ames, Iowa; Leslie H. Cochran, Central Michigan University, Mount Pleasant, Michigan; Gordon Funk, Los Angeles City School Districts, Los Angeles, California; Robert G. Hammond, Colorado State College, Greeley, Colorado; James A. Kichefski, Joliet Township High Schools, Joliet, Illinois; Robert F. Schrader, Miami University, Oxford, Ohio; and, C. W. Wilken, St. Paul Public Schools, St. Paul, Minnesota.

It is hoped this report on innovative programs in industrial arts will serve as a stimulus to programs throughout the United States and Canada, and that it will encourage others in the profession to report on innovative programs which escaped the survey of this study.

The Publications Committee wishes to express its appreciation to the members of the Innovative Programs Committee for their excellent work, and to those state and local persons who took the time to assist in identifying and reporting on the innovative programs included in this bulletin. A special word of thanks is due Walter C. Brown, Chairman of the committee, for his planning, organizing, editing, and carrying out of the coordinating functions of the assignment, and to James A. Kichefski who, as a member of the committee and a graduate assistant at Arizona State University, did much of the synthesizing of the program reports and preparation of final copy.

Appreciation is also due Gardner Boyd, Missouri; Ivan Hostetler, North Carolina; Frederick D. Kagy, Illinois; and, Walter J. Robinson, Louisiana, for their contribution to the project.

ERNEST L. MINELLI
Chairman
Industrial Arts
Publication Committee

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Introduction

In recent years, the well-publicized population and knowledge explosions have focused much attention upon the schools of our nation. Pressures, both from the public and from professional educators, have produced many experimental and innovative programs aimed at meeting broadened objectives. Pilot programs utilizing current theories of teaching and learning are being designed to improve the efficiency of the educational process. Industrial arts, at all levels, has accepted this challenge, and new programs are developing even though there may seem to be constricting rigidities in school organization.

Innovations are a result of a variety of needs. In some instances. change is dictated by new scheduling techniques that stress the need for large group, small group, and individualized instruction. In other cases, educational technology is implemented in an attempt to reach the student by various media that supplement printed material and allow an individual to progress at his own rate.

Efforts to relate industrial arts to other subjects, so that all subjects will be reinforced and made more stimulating, have resulted in interdisciplinary approaches. Programs that bring the school, the home, and the community together to motivate students to complete high school and to continue in post-secondary education have proved successful. The demands of society to make education more relevant, with emphasis upon technological advancement, have also brought new concepts into industrial arts teaching.

Since innovation is a continuous process, projects included in this report may have changed since collection of the data. Programs summarized in this bulletin were selected because they appeared to be operating successfully under certain conditions. This does not imply that they are the answer to all problems in industrial arts education. No claim is made that all truly innovative programs are included nor that all programs selected are necessarily the best of those operating in the United States and Canada. Although some programs may appear to approach vocational education objectives, they are included because of their implications for industrial arts.

The members of the Committee on Innovations in Industrial Arts recognize the need for the sharing of information on innovation. Educators seeking change will profit by the successes and failures of others who have led the way. The format for this bulletin was designed not only to give credit to individual schools and innovators, but to provide a source of detailed information for the implementors of similar programs. It should be noted that many of these projects have also received publicity in professional journals.

A full listing of program titles, the schools, agencies or areas involved, and the persons reporting is included in the Appendix to this study.

Elementary and Secondary Education

The comprehensive nature of the public schools provides an excellent setting for innovation in industrial arts. This section of the bulletin consists of brief summaries of programs that experiment with instructional content, methodology, and/or organization-management. The innovations are grouped under nine subheadings that identify the unique characteristics of the programs.

Group Activity Project

Program Title: Aircraft Design and Construction

Cabool High School, Cabool, Missouri

One general metals class has been used in an attempt to establish a realistic approach to the relationship of education in school and adult life in industry. This has been accomplished through class construction of a certified aircraft.

Two methods were utilized in fulfilling the objectives of this innovative program. The first was the completion, in one school year, of

a Corbin project. The second approach involved student design and construction of a larger, more complex aircraft, and required more than one year for completion.

Both projects have been financed by a patron who will own the plane upon completion. The patron has agreed to furnish the required materials, special tools, and special services not normally available in the school shop. A contractual agreement is recommended to afford protection to both the patron and the school.

The technique of group activity need not be limited to the aircraft industry. Cabool High School has found that group projects are successful in other industrial arts areas where student interest can be increased by participation.

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Individualized Instruction and Independent Study

Program Title: Audio-visuals in Industrial Arts

Medicine Hat High School #76, Medicine Hat, Alberta, Canada

Because the multiple-activities junior high program requires much individualized self-instruction, this industrial arts department has constructed a unit considered superior to the traditional information sheet, textbook, workbook method of teaching. The unit consists of a specially constructed daylight rear-view projection screen for use with a carrousel remote control slide projector, coupled with a stereo tape recorder for sound. One channel carries the narration to the pupil via one of eight earphones, while the other channel relays signals to the projector for automatic changing of slides. The entire unit is mobile and costs approximately $600 to build.

The slides were chosen for use, rather than filmstrips, because they are less likely to suffer costly damage from pupil use of the equipment. Made either from the filmstrip or by the teacher, the slides also provide greater relevancy to each particular unit of instruction. The projection unit is used for leathercraft, woodworking, electricity, metal-working, graphic arts, and plastics. Quiz sheets and workbook-type sheets are used by the pupil to guide his responses following his viewing and listening.

The designers of this unit highly recommend the use of cartridge tape recorders to facilitate student operation. Quality earphones are necessary to reduce maintenance time, and the projector and recorder units must be properly sealed to eliminate dust.

Although a great amount of teacher time is used in preparing the slide-tape programs, these innovators believe that individualized instruction is superior to other forms of teaching. Furthermore, this learning method has proved especially beneficial to students with reading deficiencies.

Program Title: High School Project for One

Mary Walker School District, Springdale, Washington

This program, designed to implement individual or small-group study, has been developed by the

Northwest Regional Laboratory in cooperation with the Mary Walker High School. Industrial arts is included in a "systems" approach providing study in the areas of arc welding, electronics, and expandable polystyrene plastic beads. However, the total program includes speech, mathematics, and physics.

Any student, boy or girl, in grades nine through twelve may work on the program of his choice during the scheduled time. Students are allowed to work and progress at their own speed and are free from the typical instructor-dominated classroom. Teachers are available to provide assistance when it is requested by the student.

Because of the acceptance by the students of individual and small-group learning, additional systems are now being developed. A non-period, or flexible schedule, is recommended for this program because the time required to complete each unit varies with the individual.

Program Title: Individualized Instruction in Industrial Arts Electronics

Oberon Junior High School, Arvada, Colorado

The major purposes of this program of individualized instruction are to stimulate a climate for inquiry and to allow each student to progress at his own rate. Learning packets, considered the backbone of the course, are provided to allow study, reinforcement, and self-testing as each student progresses individually. Reading assignments are available on tapes and can be read and listened to in the library or sound laboratory.

Essay question sheets and multiple-choice question tests are used with each reading assignment to determine if the student is ready to proceed with the laboratory experiments or if he needs more time and help with the reading assignments. The test is used only as a help for the students and not as an evaluation by the teacher. Each laboratory experiment has been carefully programmed with step-by-step instructions and appropriate places to record findings.

The individualized approach requires practically no large-group work. Each student starts the course where his background permits and he is self-paced and directed.

Experiments at Oberon Junior High have been carried out to compare the traditional lecture-assignment approach with the learner-directed individualized study method. Results of test scores indicate that there was no significant difference between treatments, but great differences were noted in attitudes and behaviors. Students in the experimental group showed a markedly higher interest and motivation, progressed at greater speeds, and were more self-directed. In the experiment, students who went from *traditional* to *experimental* classes showed these changes in attitude, interest, and behavior, and verbalized their opinions. Students who went from *experimental* to *traditional* classes not only showed a reverse of the behaviors, but were reluctant to participate and cooperate until the teacher abandoned the traditional for the experimental approach.

Program Title: Individualized Programming of Industrial Arts Content

Nova High School, Fort Lauderdale, Florida

Two main features in the program help to allow for individual differences. The first is modular scheduling, which provides flexibility in the total school schedule and allows flexibility for meeting the time needs of a single student. The second is the Learning Activity Package, or LAP, as it is called at Nova.

This LAP is a form of programmed instruction, but with some special characteristics. The teacher is built in as an integral part of the LAP. It uses clearly stated behavior objectives arranged in order of learning level so the student understands what is expected of him. A variety of media and modes is used to help the student master the objectives. And, of great importance, the student is given the opportunity of making choices. These choices cover such things as whether to take a self-test or start directly on assignments, which assignments to do in order to meet the objectives, which of the media and modes is best suited for him, and to what depth he will work in a LAP beyond the required objectives.

Program Title: West Carrollton Blocktime Plan

West Carrollton Senior High School, West Carrollton, Ohio

The West Carrollton Plan offers individualized technical training to juniors and seniors who enroll in industrial arts. Of major importance in this plan is the fact that the responsibility for learning is placed on each individual student. The student selects the area he chooses to explore and may elect as many as three hours of industrial education. He may work in more than one area

at a time and is not committed to single areas for a full school year, or semester, as is typical in most schools.

Since each student is permitted to work independently and with the assistance of a number of teachers, the five school shops have been equipped with time clocks, each of which registers a different color. Each student is issued a time card so it is possible to know how many hours he has spent in any one area. This time can be compared with the work accomplished for evaluation purposes.

This plan has fostered teacher flexibility, a type of team teaching, and perhaps most important, relevance of subject matter for the student. With the exception of the cost of the time clocks, no additional expense has been incurred in implementing the program.

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Manufacturing and Mass Production

Program Title: Corporation Experience

Serramonte High School, Daly City, California

The Engineering and Corporate Production classes at Serramonte High School consist of student organization and operation of a company for the entire school year. The classes consist of two basic areas: the Engineering Design Departments in the mechanical drafting area, and the Production Job Shop in the wood-metal-plastics areas. The company organization includes departments of accounting, programming, design, engineering, drafting, sales, and production. Department heads make up the management, whose job it is to coordinate and carry out the company operations.

The student companies have produced goods and services ranging from building cabinets for the school to a study of the efficiency of the cafeteria with recommendations for improved services. The objectives of the program have been broadened to provide realistic production and management experiences under time and cost schedules.

The program, originally started in 1961 with five students in Daly City's Jefferson High School, is now operating in three district schools. Two federal grants have been received to develop the Serramonte program.

Program Title: Manufacturing

Evanston Township High School, Evanston, Illinois

In order that students in industrial arts might understand the unity and wholeness of modern industry, the Evanston Department of Education, under the guidance of University of Illinois curriculum consultants, has revised its freshman technical-arts program. The original system of rotating through the six areas of drawing, woods, metals, graphic arts, electricity-electronics, and power mechanics seemed to provide little opportunity for exploring the interrelationship of the functions of industry. Department instructors believed that the traditional program of study of tools, processes, and materials had much to offer, as did individual project making, but that fundamentally it was rigid and inflexible. They also thought such inflexibility made it difficult to keep up with the technological changes that today's students face, and that teaching of some

basic skills—skills that might quickly become obsolete—might be replaced, in part, by the teaching of concepts that show how individual experiences are related to total experiences. It was decided to divide the curriculum into the major areas of goods-producing and goods-servicing in order to provide exposure to as many functions of industry as feasible.

Now, during the first semester, students are rotated through the six areas with exposure to the functions of industry. In the second semester, students choose their own areas of specialization, organize a company, and mass produce saleable products.

Product manufacture is carried out largely in the woods and metals areas. Drawing and graphics arts are combined into a graphic communications area, with responsibilities for product design and development, advertising, and printing the company newsletter, inspection tags, letterheads, and job application forms. This division is also responsible for the design and manufacture of the packaging unit.

Electricity-electronics is now combined with power mechanics into a power technology area. Production line tabulation equipment and quality control devices are a feature of the unit. Goods-servicing industries are simulated through small engine repair. Student experience with personnel relationships are achieved through interaction of a management force with its board of directors and a labor force with its union and grievance committee.

Educational filmstrips describing industrial functions have been prepared by two staff members and are produced commercially by the Society for Visual Education.

At the time of this writing, a large multi-purpose room has been planned to house this program. New plans will also incorporate large and small group instruction, a department resource center, and the use of the school's data retrieval center.

Program Title: Mass Production for the Individual Project

Roosevelt Junior High School, Pittsburg, Kansas

The purpose of this program is to provide a better understanding of industry while still retaining the individual project. This unique idea is accomplished by mass producing the individual project. Each student selects his project from a list of suggested projects that have been grouped according to their general construction. The students in each group then proceed to work out certain design and construction changes satisfactory to the entire group or "company."

Students are introduced to industrial arts through a teacher prepared line-production problem that requires about one week of classes. These techniques are then used throughout the year, along with other school and community resources, to reduce time-consuming individual work and provide more time for exploring other areas.

The object of the program is to teach *"industry"*—not *"woodwork."* Metals, plastics, and printing have been incorporated into the projects. Group participation has resulted in the development of a feeling of success for the slower student and leadership qualities for the better student.

Program Title: A Study of Manufacturing Industries

Shiloh Junior High School, Parma, Ohio

A new course for seventh grade students has evolved through an experimental program in industrial arts at Shiloh Junior High School. In the experiment, two regular classes of seventh and eighth grade boys were combined on a full-time basis for a semester. A regular class of ninth grade students participated intermittently as consultants, providing instruction and demonstrations for the younger boys. Combining the grades resulted in more effective laboratory utilization, stimulated motivation, and increased the ability for self-direction and responsibility in learning.

Students studied the growth and development of American industry and the functions and activities representative of manufacturing corporations. In three companies that were formed, the students raised capital to finance the development and manufacture of products, which they sold in order to realize profits. The group activities, and the interaction among students of different grade levels working together, were found to be most beneficial and are highly recommended as objectives in this program.

Program Title: Understanding Industry Through Mass Production

Dayton City School District, Dayton, Ohio

This study of industry has been incorporated into a social studies core to deal with manufacturing in the city of Dayton. The program attempts to eliminate subject matter fragmentation and provides guidance material through a career conference week which involves all academic and special subjects.

A laboratory manual has been developed consisting of sample

drawings, a design problem, a production tool checklist, a pictorial listing of production jobs, a production routing sequence, and operation breakdowns. The concept of industry is studied through mass production; field trips and motion pictures are used to compare automated and small job shop industries.

Many fine programs exist in the area of manufacturing and mass production. Listed below are the names of additional schools operating programs, with a brief statement of the activities included.

Program Title: In-line Production Experiments

Orchard Hill Junior High School, North Haven, Connecticut

Two production experiments in the manufacture of wooden trivets and metal bookholders have been conducted for eighth grade students. Each experiment took only three weeks to complete, and included company organization, sale of company stock, product design, construction of jigs and fixtures, production scheduling and manufacturing, and sales and distribution.

Program Title: Mass Production Unit

Hardin Junior High School, St. Charles, Missouri

Each of six classes used industrial methods to set up a company that designed, manufactured, and marketed a product. One mass-produced article, an emergency automobile light, was used to finance a field trip through an automobile assembly plant in order to observe industrial production in action.

Program Title: Team Teaching of Mass Production

Greenville Junior High School, Greenville, Tennessee

The effects, advantages, and disadvantages of mass production are studied in this team-teaching approach to industrial arts. The facilities of the general comprehensive shop and the drafting room are utilized to produce articles researched, designed, and distributed by student-formed companies. Incorporated into this highly motivational program are units in woods, metals, plastics, electricity, automechanics, drafting and technical illustration, and graphic arts.

Group participation has impressed students with the necessity of teamwork, sound business practices, and the importance of tolerances when manufacturing products with interchangeable parts.

Program Title: Manufacturing in Industrial Arts

Illinois State Normal University High School, Normal, Illinois

These techniques of manufacturing are considered a realistic base for vocational guidance at the junior high level. In the high school, manufacturing becomes more sophisticated by involving as many teachers and materials as possible as replications of the departments of industry are produced.

Materials Fabrication and Testing

Program Title: Materials Fabrication and Testing

Plantation Senior High School, Fort Lauderdale, Florida

This innovative program is intended to be conceptual in nature

rather than facts or skills oriented. The laboratory has been specifically designed for a comprehensive study of technology, with materials testing playing a key part in the objectives of the program. Courses have been established for a three-year program covering the major headings of materials, processes, and fabrication for the ninth grade level and above.

Laboratory facilities include equipment for metals machining and forming, light foundry and casting, heat treating, and welding. Plastics equipment includes injection molding, plastics oven, vacuum forming and laminating. Woodworking equipment capable of normal machining and fabrication is included, and finishing techniques include coating, spraying, and plating of the various materials.

The testing laboratory, considered the heart of the program, enables the students to achieve a thorough understanding of the materials that are the building blocks of today's world. The theme of testing is carried all the way from space research, to commercial television, to children's toys. Students use the Polariscope, universal testing machine, hardness tester, and a Metallograph equipped with camera to conduct experiments on materials and joining methods.

Individualized instruction is a vital part of the program and independent study is necessary at the third-level course where outside activity and self-directed research are a must.

Mobile Instructional Units

Program Title: Industrial Occupations

The Board of Public Instruction, County of Polk, Bartow, Florida

As many school districts are, the Polk County System is divided into a number of administrative units, each unique in its resources, laboratory and shop facilities, teaching personnel, and particular socio-economic factors. Studies in this district of projected area growth and population characteristics resulted in a plan, developed under P.L. 89-10, to provide broadened industrial education, particularly to the disadvantaged youth in the junior and senior high school. Unique in this plan is the inclusion of items that lend themselves to use in mobile instructional units.

The project provides machines, tools, visual aids, supplemental printed material and guidance and supervision services coordinated with existing programs in industrial arts. Current and future needs are identified by a committee of school, business, and industrial members, and emphasis is placed on providing introductory and exploratory experiences in industrial occupations.

A major objective is the arousal of student interests and the discovery of aptitudes that hopefully will stimulate success and give new direction to potential dropouts.

This plan has enriched industrial arts programs at the various schools by making available additional and new equipment on a rotating basis. A panel-type van and a heavy-duty equipment trailer are used to transport equipment. Scheduling of equipment and in-service training are coordinated by a fully certified industrial arts teacher employed specifically for this new program.

Motivational Programs

Program Title: Career Guidance Program

Board of Education of the City of New York, Brooklyn, New York

Operating in approximately 50 junior high schools involving 2200 students in their terminal year, the Career Guidance Program was designed to improve the school's holding power as well as motivate youngsters to continue their education in academic and technical high schools. In each school, a cluster of three classes is organized in a "school within a school" atmosphere. Five teachers are assigned full-time to this cluster—three academic teachers, one guidance advisor, and one industrial arts teacher.

Special features of the program include a maximum class size of 15, intensive individual and group guidance, a crash program of corrective work in tool subjects, occupational information, pre-vocational training, a specially designed curriculum in every area, and opportunities for part-time employment.

In order to acquaint the pupils with the many career opportunities available, new curricula, not usually offered in junior high school, have been introduced, e.g., Office Practice, Foods, Hospital and Camp Service, Power Mechanics, In-plant Printing, Building Construction and Maintenance, and General Construction and Repair.

To implement the industrial arts program, a multi-area career guidance shop layout was designed by

the Industrial Arts Department in co-operation with the School Planning and Research Division of the Board of Education. The facility has been introduced in five experimental pilot schools.

The success of this program has been evident in a number of behavioral changes. The pupils showed an appreciable improvement in attendance, work habits, personal appearance, and attitude toward self and school. A large segment of the pupils were placed in part-time employment during their stay in the Career Guidance Program, and virtually every pupil was promoted into either a vocational or academic high school. The program, originally financed through the New York City School budget, has been expanded in recent years with the aid of E.S.E.A. federal funds.

Program Title: Family Living in an Urban Society

Board of Education of the City of New York, Brooklyn, New York

A pilot program designed to help students meet their needs in regard to their family unit as well as their community has been developed and expanded for the intermediate schools of New York. This program involves industrial arts, home economics, health education, sex education, and consumer education as well as the traditional academic areas. A uniform set of concepts has been developed and these are taught in all the curriculum areas involved in the program. The activities and discussions of the industrial arts shops revolve around these concepts to include the responsibilities and duties of family members, home repairs, safety in the home, and consumer education.

The teachers involved in the program have been given the opportunity to participate in a training program by attending a series of workshops. The teachers were paid for participating in these sessions which were held after school, on Saturdays, and during holidays.

Program Title: Ford Foundation Correlated and Pre-technical Programs

Board of Education of the City of New York, Office of Curriculum, Brooklyn, New York

Two separate programs, based upon the philosophy of the Richmond Plan, are operating in the New York School System. Both projects are aimed at remotivating the underachiever through correlated curriculums. A vigorous effort is made to create school interest through industrial, medical, and business technologies. Introductory courses in the ninth and tenth years emphasize basic knowledge and skills in each area as well as a knowledge of occupational opportunities. Special curriculum materials were developed for the eleventh and twelfth grades in order to facilitate a broad interdisciplinary approach among the various subjects.

Program Title: Home and Community Practical Work Experience Program

Board of Education of the City of New York, Brooklyn, New York

This summer work-experience project was designed to teach neighborhood ghetto youths home maintenance skills and to develop community pride, cooperative work habits, and an awareness of home safety precautions. An additional objective was to explore the possibilities for these youths in the mechanical and allied trades. Forty-two boys and girls between the ages

of 14 and 18 were enrolled in the project and were paid by the Neighborhood Youth Corps.

An abandoned dwelling in the Ocean Hill-Brownsville area was used as a practice building for the six-weeks project. The program was coordinated by an industrial arts supervisor, and instruction was supplied by an industrial arts teacher assisted by adult crew leaders. Salaries and money for supplies were furnished by a Ford Foundation grant.

Program Title: Motivating Disadvantaged Students

Wichita Public Schools, Wichita, Kansas

Two motivational programs have been organized in this school district, with financing provided by Title I, for the purpose of stimulating greater student and community participation in the activities of the school.

In one program, evening and Saturday classes in woods and metals were organized in four disadvantaged areas of the city. Flexible enrollment procedures allowed the parents to join their sons in working on projects. Tuition and material costs were provided by federal funds.

In the second program, home improvement and repair groups were established in four locations in order to provide students with skills and information necessary for home maintenance. Houses were painted, screens repaired or replaced, windows glazed, steps and fences repaired or repainted, and minor roof repairs made on 25 homes. The program operated for two months, and federal funds were used to pay instructors and provide the first $50.00 of supply costs for each house. Each student who completed the program received $100.00 as payment for the hours worked.

Program Title: Pre-tech Program of Interdisciplinary Instruction

San Lorenzo Valley Unified School District, Felton, California

The major purpose of pre-technical education program is to motivate the capable, average, underachieving high school boy to work up to his capacity. The program is designed also to help students appreciate the value of academic subjects by relating them to occupational skills through practical application. This has been accomplished by fusing mathematics, physics, English, and shop experience into an interrelated block in which each course reinforces the others. An attempt has been made to interest the student in a field of technology, and to motivate him to either enter the technical field upon graduation at a trade or technical school or at the local community college. Eighty-eight percent of the graduates have continued their education in such institutions.

The program serves boys of the eleventh and twelfth grades. The students selected are those who have typically been enrolled in college preparatory classes, but do not achieve well enough to qualify for college entrance. They have completed one year of algebra and read no more than one grade level below average for grade placement.

The central core of the first-year program is physics. The second year has as its core the field of electronics. However, the prime ingredient of the entire program is an interest in the success of the student in becoming an active learner. The four teachers involved in the program meet together daily to correlate their disciplines so that subject matter has relevance.

Program Title: Pre-work Program

Jefferson Junior High School, Columbia, Missouri

In this school district, an analysis of the characteristics of and future for the youngsters identified as potential dropouts has resulted in after-school classes directed toward attitude change. The students involved in this project are those considered educationally deprived because of socio-economic and academic achievement standards. Research has shown that lack of proper attitudes rather than lack of skills keeps this type of boy from being successful in the non-skilled jobs that he is capable of performing.

A work-type situation was organized in the industrial arts laboratories from 3:30 p.m. until 5:00 p.m., three nights per week, for eighteen weeks. Students elected their own foremen, received instruction in woodworking, and constructed projects. The opportunity to work with tools and machines provided the motivation needed to make the program a success.

Several unique features were incorporated into the organization of this program. First, a social worker was employed to meet with half the class on Monday night and half on Wednesday night. With this arrangement, the boys proved to be open and cooperative.

Skilled craftsmen were invited to the school to discuss, informally, the nature of their trades and the training and attitudes necessary for success. Nine talks representing nine different areas were scheduled and proved stimulating to the group. Field trips to various industries in the area also were enlightening.

A survey of school personnel indicated that the attitude of the boys

involved in the program did change. These students, who generally had a high absence rate, were enthusiastic about the class, and with but one exception, had perfect attendance in school on the days when their "club" met. For long-term results, the innovators of the program recommend an extension that will lead beyond the ninth grade and into a cooperative work-experience program.

Program Title: Summer Production Woodworking Project for Constructing Teaching Aids

South Junior High School, Colorado Springs, Colorado

The purpose of this eight-week summer program was to provide pre-vocational experience, employment, training, and high school credit for 18 tenth through twelfth grade boys, classified as disadvantaged. Another goal was to determine whether the interest and motivation generated by such a program could increase the holding power of the school and stimulate these boys to enroll in industrial education courses.

Actual class work consisted of the construction of various types of classroom teaching aids requested by elementary and secondary teachers. The vocational cabinetmaking instructor selected those aids considered suitable for construction by the students in the program. The students worked six hours per day, five days per week for eight weeks. They received $1.40 per hour for three hours a day, and high school credit for the other three hours.

The staff for the program consisted of one vocational cabinetmaking instructor and a part-time vocational counselor. In addition, two students who had previous woodworking experience acted as assistants to the instructor.

Of the 18 students enrolled, all except one returned to school and enrolled in industrial education courses.

Research and Development

Program Title: The Anthropological Unit Approach to Industrial Arts

Earle B. Wood Junior High School, Rockville, Maryland
Jefferson County School District, Wheat Ridge, Colorado

These two programs, similar in nature although from diverse sections of the United States, have been created around the philosophy developed at the University of Maryland (see page 26) in an effort to interpret industrial arts realistically as a study of technology and industry.

The major purpose is to provide junior high students with an understanding of the development and contributions involved in man's technological achievements. This is done through a study of man's mastery of raw materials, his progress in learning to make tools and machines, his ability to harness power and energy sources, and his development of communication and transportation devices. The subject matter or course content emphasized at this level is the study of technology. Three comprehensive units are organized to provide the learning experiences: (1) The Development of Tools and Machines and Their Contribution to the Growth of Civilization; (2) The Development of Power

and Energy and Their Contribution to the Growth of Civilization; and, (3) The Development of Communication and Transportation and Their Contribution to the Growth of Civilization.

Each student selects a specific subtopic from the general unit for research and development. Representative subtopics pursued are the development of the printing press in the unit on tools and machines, or the development of Conestoga wagons and stagecoaches in the transportation unit.

The student's work consists of researching the topic, presenting real and written evidence of his study, making plans and layouts, and constructing an authentic model or display of the project.

Program Title: Contemporary Units of Study

Roosevelt Junior High School, Cleveland Heights, Ohio

In the contemporary unit, the student studies the more recent innovations concerned with present technology, and how these innovations may affect industry. The unit method is an experience in which the teacher and the students work together in developing an investigation around a certain topic, theme, or field of inquiry. Rather than merely being a dispenser of facts, the teacher modifies his role to that of coordinator-of-learning. In this new situation, the teacher is better able to apply successful principles of learning that place the students in an active, rather than passive, learning situation.

In recent years, industrial technology has made exciting discoveries through research. Electron guns, lasers, super magnets, electrochemical tools, and ultrasonic vibrators are making their factory debuts. In this innovative program, topics such as powdered metallurgy, plastic injection, urethane forming, and electrical discharge machining have been studied. Each student researches a topic, presents an oral and written report, and constructs a model as a representation of his selected unit. The contemporary unit provides a method whereby students are continually engaged in three broad education ventures—research, planning, and construction.

Program Title: Research and Experimentation in Industrial Arts

Montgomery Hills Junior High School, Silver Spring, Maryland

The Industrial Arts Research Laboratory is the result of cooperation between the University of Maryland and the Montgomery County, Maryland School System. It is a program based upon contemporary society and the needs of future engineers, scientists, researchers, analysts, and similar persons. Its success lies in the curiosity and intrinsic motivation of the individual.

The program makes available the industrial arts tools, equipment, and materials with which the student can test and evaluate products, processes, and materials while applying scientific theories and procedures. Each student selects a problem that interests him and can be solved through research and experimentation. The emphasis is on learning procedures, rather than on subject matter. The teacher coordinates the program, and the responsibility for subject and depth of study rests with the student.

A laboratory setting is established in which each student wears a white laboratory coat, has his own clipboard and identification, and keeps charts of his progress. Students are allowed the special privileges of taking individual and small-group field trips, they have use of the school telephone and official school stationery in order to contact experts in their field, and they have free access to the library. During any particular class period, students may be found working in a variety of places both inside and outside the school.

Team Teaching

Program Title: The Middle School Industrial Arts Program

MacDonald Middle School, East Lansing, Michigan

The major purpose of this program is to provide exploratory experiences in industrial arts for grades six, seven, and eight. Based upon the middle school philosophy of this community, the program requires the participation of both boys and girls of the sixth and seventh grades. Industrial arts is an elective for eighth grade students.

The middle school concept makes optimum provision for individualized curriculum and instruction and balanced attention to the student, society, and organized knowledge. To achieve this balance, the middle school is organized around the areas of personal development, skills for continual learning, and the disciplines of mathematics, science, social studies, and English. The middle school industrial arts program is part of the personal development area and utilizes the efforts of the other areas in providing learning opportunities geared to develop values and explore interests.

Several innovative features are

used in this program—team teaching, a unified arts approach, open laboratory time, joint use of the laboratory by grades seven and eight during the same time periods, and the joint use of physical facilities with the art department. The unified approach involves cooperation of the skills for continual learning and organized knowledge area teaching teams and the teachers of industrial arts, art, and home economics.

General shop experiences are provided in metal, plastic, wood, and graphic materials. A ceramics laboratory is used jointly by the art and industrial arts students. Both group and individual participation is stressed in this program.

Student responsibility for learning has been increased by including open laboratory periods in the schedule. This twice-weekly laboratory time is available to all seventh and eighth grade students. The only requirements are that the student is currently in an industrial arts class or that he has completed one semester of seventh grade industrial arts. The student is free to work in any area of his choice.

Technology

Program Title: A New Industrial Arts

Warrensville City School District, Warrensville Heights, Ohio

In the spring of 1967, the Warrensville School District was awarded a grant under Title III of the Elementary and Secondary Education Act. The grant was allowed for the purpose of developing an industrial arts curriculum based on the philosophy of Dr. Delmar W. Olsen as expressed in his book *Industrial Arts and Technology*. The program developed supplants the traditional skill-oriented industrial arts with a concept-based curriculum designed for the entire student body, both boys and girls.

The procedure employed in this project included surveys of and visitations to exemplary industrial arts programs, in-service training for the staff, curriculum research by the industrial arts staff and selected personnel from other disciplines in the high school, and evaluation by consultants from education and industry.

The new program developed from the research places emphasis on the creative problem-solving approach to all areas of instruction. This approach allows personalized instruction and considers each student as an individual who has unique desires and needs. This new industrial arts program is to be non-vocational and will attempt to teach the basic concepts of industry that do not change. These are the concepts of materials selection, materials forming, production methods, the principles of supply and demand, distribution, and testing.

The program starts at the junior high level with an exploration of the elements of industry. At the senior high level, each student may move vertically for an in-depth study of a technical specialty or he may diversify by sampling a number of areas. The areas of instruction are graphic communication, power and transportation, electricity and electronics, and manufacturing and construction.

Program Title: Industrial Education 23

Unified School District No. 1, Racine, Wisconsin

In an effort to enlarge upon the

traditional six basic industrial arts offerings and more adequately prepare pupils for the world of work, this school has devised an entirely new course for the tenth grade level. The concept of the course is considered to be diametrically opposite from the traditional shop, hand-skill development found in many industrial arts programs.

Generally, the course is described as a lecture-discussion class with some meaningful activities geared to the reinforcement of basic learning. Language arts skills and reading comprehension are reinforced through the use of technical reports, journals, reference manuals, and engineering and machinery handbooks. Knowledge of mathematics is reinforced with real problems of industry involving quality control, bills for materials, cost calculation, estimating, and time study. The understanding of economics is accomplished through a thorough study of industrial organization as viewed by both labor and management.

Areas such as manufacturing, construction, power-transportation, communication, and the service industries are considered. The general objectives of the course are fulfilled through experiences in sketching and visualization, quality control and inspection, materials and product analysis, research and testing, creativity and design, and problem solving.

Industrial Education 23, so named for administrative purposes only, is a full year course that meets daily for one period.

Program Title: Industrial Arts Curriculum Project (Pilot)

Cincinnati City Schools, Cincinnati, Ohio

Four junior high schools in Cincinnati are field testing the Ohio State Industrial Arts Curriculum Project. This course not only presents the production aspects of industry and the use and processing of materials, but also deals with many management and personnel functions involved in the organization and use of materials to build or manufacture goods for human wants. The two courses in the series, "The World of Construction," and "The World of Manufacturing," are discussed in more detail in the college curriculum reorganization section of this bulletin.

The teachers of this district are specifically involved in implementing and evaluating the project-prepared instructional materials. Weekly reports and recommendations are filed and will be used by Ohio State in the revision of the teachers' guides, workbooks, and texts.

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Special Education

Industrial arts has often been charged with some responsibility in educating handicapped youth. The task of identifying abilities and developing confidence and skills requires a unique organization involving specially educated personnel. Two exemplary programs are highlighted in this section to illustrate what schools can do to meet this challenge.

Program Title: Industrial Arts for the Handicapped

Edmonton Public School Board No. 7, Edmonton, Alberta, Canada

A laboratory designed to accommodate classes of twelve students has been designed for physically and/or emotionally handicapped students in grades seven through twelve. Experiences are provided in a multiple activity setting in the areas of materials, power, graphic communication, and electricity/electronics. Also included is a social study of the pressures of the world of work.

In order to permit disabled student operation, many modifications have been made to standard equipment and a unique safety program and system has been designed and installed. Students are encouraged to solve their own problems as much as possible and to use the self-contained audio-visual center during this two-hour weekly class.

The program operates in the Glen Rose School Hospital where a complete program of occupational therapy, speech therapy, physiotherapy,

psychiatric service, social service, medical service, and education is provided for the students.

Program Title: Industrial Arts for Mental Retardates

Board of Education of the City of New York, Brooklyn, New York

National Defense Education Act funds have been used in this program to purchase graphic arts equipment needed to set up publications shops for trainable and educable young men and women from the ages of 17 to 21. The innovative feature of this program is considered to be the gradations of skills dealt with in order to reach and teach students in this classification. It attempts to improve the applied reading and mathematics achievement level of the students, and to teach salable skills in the areas of offset printing, mimeographing, addressographing, collating, packaging, and simple hand composition.

The publications shop is set up to operate full morning and afternoon sessions on a work-study basis. Students work at jobs in industry for a half a day and return to school for additional training and instruction. Materials needed to conduct the program are supplied by those nonprofit organizations for which printing, collating, and mailing services are performed.

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College and In-service Education

Many of the programs reviewed in the elementary and secondary section were nurtured by the emerging philosophies at various institutions of higher education. This is particularly true in the area of curriculum reorganization, where studies are being carried on to identify substantive content of industrial arts. These attempts vary from new individual courses to concept approaches for the complete industrial and technological complex. Critical examination has also been made concerning the preparation of teachers. Programs are being developed that provide industrial arts teachers with broad understandings of industry in occupational clusters as well as industrial internships.

In-service education programs are being used in a number of school districts as a means of encouraging teachers in developing innovative industrial arts activities and approaches. Several such programs are reported here.

Curriculum Reorganization

Program Title: American Industry Project

Stout State University, Menomonie, Wisconsin

The intent of this project is to offer industrial arts a totally new direction based on the study of industry rather than the study of technology. The program that has been developed is based upon the assumption that industrial arts should meet two objectives: (1) to develop in the student an understanding of industry; and, (2) to develop in the student the ability to solve problems.

One of the major tasks of the project has been to identify and classify the common elements of industry into a logical structure, regardless of the products they distribute or the services they render. A concept approach has been adopted to isolate 13 major interrelated elements or groupings of knowledge. These 13 concepts are: energy, processes, materials, production, management, marketing, relationships, procurement, research, property, finance, transportation, and communication.

A three-level curriculum is being developed for secondary school industrial arts. The first level attempts to develop a broad foundational understanding of industry, the second level will be an in-depth study of the major conceptual areas, and the third level will allow the student to do research and experimentation in one or more of the conceptual areas.

The program is operating at various levels in 14 states. A pilot teacher education program, based upon the theoretical model of an effective teacher and incorporating current innovations, has been developed and students are presently enrolled. The program has been presented with an outstanding achievement award by the American Association of Colleges for Teacher Education.

Program Title: Development of a Common Body of Knowledge for a Study of Technology in a Systems Approach of Industry

Eastern Illinois University, School of Industrial Arts and Technology, Charleston, Illinois

University research funds have been utilized at Eastern to examine the feasibility of restructuring course content in the study of industry. The study has been used to explore methods of structuring course content for commonality of areas of technology, and to identify the fundamental building blocks needed for further study in technological achievement. Research has been done to identify attempts at problem solving and creativity as teaching methods to be used in structuring the fundamentals of technology. An analysis has been made of other innovative approaches in teaching industrial arts and technology.

A new course has been created at this university, the content of which will be a "big picture" look at industry, and what is being taught in some of the major innovative programs across the country. A second course is planned to deal specifically with the common body of knowledge. The common body will be tentatively identified as materials, processes, energy, information, and machines as the integrated basis of an educational industrial system.

Program Title: Functions of Industry

Wayne State University, Department of Industrial Education, Detroit, Michigan

The term *functions of industry* identifies a taxonomy used to classify the industrial matrix into major categories of related activities. The categories are intended to serve as the basis for program development in industrial arts.

Industry is defined as that basic institution whose role is to produce and service products. Two complementary but discrete divisions are identified within this basic institution. The first embraces all activity involved in the production of a product; the other, all activities associated with the service of the product. Activities concerned with the distribution of the product are recognized but not included in those activities identified with production or service.

All industrial activities concerned with the production of a product have been grouped into four major functions: (1) research, (2) development, (3) planning, and (4) manufacturing. All activities concerned with the service of a product have been grouped into three major functions: (1) diagnosis, (2) correction, and (3) testing. Capital, in its broadest sense, and the use of manpower and all its ramifications are recognized as essential ingredients in the industrial matrix.

In the functions of industry concept, industrial education is conceived as those life experiences that contribute to the individual's understanding of the affairs related to the manner in which man satisfies his material needs, and to the preparation for active participation in industry. The concept is primarily

intended to serve vocational guidance objectives.

Three guiding principles must be observed when implementing this concept:

1. Each student must have experiences in all functions,
2. The experiences, both inside and outside school, must be concrete and directly related to modern industry, and
3. The program itself and the school structure must be flexible enough to accommodate individual differences among students.

Program Title: The Georgia Plan for Industrial Arts

Georgia Southern, Industrial Technology Division, Statesboro, Georgia

The major objective of this plan is to provide an organizational structure that is more effective in meeting the stated aims of industrial arts. Furthermore, it is a plan for providing instruction and experiences, from kindergarten through grade 12, in the industrial activities of society.

Elementary education pupils gain knowledge of industry through units of study dealing with transportation, communication, shelter, clothing, food, and utensils. The classroom teacher usually provides for all needs of pupils; however, industrial arts and arts and crafts consultants are also available.

Beginning with the seventh grade, a multiple-level program develops. Approximately five to ten percent of the students are directed to terminal-type special education activities such as meet their needs. This is an ungraded program under the direction of a specially prepared teacher. All other students are directed into general industrial arts courses in communications, manufacturing, and transportation-power.

At the tenth grade level, work-preparatory and college-preparatory industrial arts programs form. The college-preparatory sequence is designed for all aspiring engineers, scientists, industrial managers and industrial educators. The three-year program starts with a non-laboratory course entitled "American Industries." This is followed by a course of Engineering Drafting and Descriptive Geometry, and culminates in a Research and Development course.

The majority of the students enrolled in industrial education are in the pre-vocational program. This is terminal education for some, but many enter post-high school vocational programs. General area and unit courses provide for a more detailed and concentrated study of tools, processes, materials, and occupations. Part-time co-op work experience, under the direction of a coordinator, provides for on-the-job training in certain industrial occupations.

Program Title: The Industrial Arts Curriculum (IACP)

The Ohio State University, Academic Faculty of Industrial Technology, Columbus, Ohio

This project was inaugurated in 1965. At the end of the first 18-month phase of the project, a document entitled "A Rationale and Structure for Industrial Arts Subject Matter" was prepared. Following this rationale, a two-year sequence in "industrial technology" was developed to provide junior high school students with learning experiences concerning modern industrial technology.

The first year's course, "The

World of Construction," is a study of man's construction production system and its major projects. The second year's course, "The World of Manufacturing," is a study of man's manufacturing system and its major manufactured products. The innovators of this project believe that it is through these two broad fields that man reshapes his material world. Students learn how man plans, organizes, and controls men, materials, and processes in order to produce such items as buildings, bridges, roads, clothing, and utilities. Students use tools and materials to produce products that are representative, at least in principle, of all of man's products produced in a factory or on a construction site.

The program has been field-tested in various states by field-center directors and teachers who have completed teacher-preparation workshops on the O.S.U. campus where they received instruction in the rationale, implementation, utilization and evaluation of the instructional program. "The World of Construction" will be ready for adoption or adaptation by June 1970, and "The World of Manufacturing" by June 1971. The instructional system now used includes specially designed teaching aids along with a textbook, laboratory manual, and a teacher's guide.

The project is financed by the U.S. Office of Education. Additional financial support for the production of instructional aids and for scholarships has been provided by organized labor, management, and professional associations. Writing, editing, and consulting services have been provided by representatives from management; labor unions; universities; and construction, manufacturing, and engineering associations.

Program Title: Industrial Arts Technology: A Study of American Industry

Gorham State College of the University of Maine, Department of Industrial Education and Technology, Gorham, Maine

The major purpose of this program is to provide a modern industrial arts curriculum and plan of implementation for the comprehensive general laboratories in the state.

To provide a basic representation of American industry, five broad categories were adopted as follows: manufacturing, construction, power and transportation, electricity-electronics, and service industries. Each of these was analyzed and a series of interest units was developed to project a picture of industry in its totality. These units are interrelated and flexible, having common elements or a central theme. By cutting across arbitrary divisions such as woodworking and metalworking, piecemeal learning of unrelated, isolated skills and facts is eliminated. Each unit is further analyzed in terms of accepted industrial arts objectives and desired behavioral outcomes, and a basic core of industrial concepts including management, engineering, production and/or service and marketing is outlined.

The six-year program is progressive or spiraling in nature, starting with manufacturing at the seventh, eighth, and ninth grade levels. Manufacturing and construction provide experiences for the tenth grade, power-transportation and electricity-electronics are taught in grade 11, and grade 12 covers the service industries.

A state curriculum bulletin has been prepared by teachers in workshops, with close coordination between teacher educators and the State Education Department.

Program Title: Industrial Materials

San Jose State College, Industrial Arts Department, San Jose, California

Industrial arts at all levels can benefit from the addition of units of study concerning the working characteristics of materials. Experimental work with the composition and physical properties of materials provides information that is essential to any group involved in project design and development. Such work can be incorporated into existing courses with little additional expense, or it can be organized into a special course, cutting across a multitude of material classifications.

Data sheets and similar documents used extensively in industry provide clues for curriculum content. Material descriptions lead to lectures and discussions concerning engineering characteristics and terminology. Inter-atomic forces, arrangement of atoms, and primary and secondary forces of attraction coupled with materials problems of cohesion, stress, strain, elasticity, plasticity, and basic physical properties can stimulate groups into meaningful investigations.

The study of materials need not be limited to the metals area. The study of fuels, lubricants, and cutting fluids can involve types and chemical principles along with materials selection, safety practices, and trends. Plastic materials provide study of polymerisation, deformation, and the selection of resins. Adhesives used in all industrial processes open unlimited opportunities for testing and selection. Protective and decorative materials afford study in color blending, adhesion problems, and selection and

application. The wood, wood products, and synthetic wood materials not only allow for investigations of structure and physical properties, but provide for investigations in merchandising, decay preservatives and moisture control, fire retardant treatments, and construction techniques. Any material used in industry can be investigated by the student in order to encourage him to look for and talk about the *why* behind every *how* when involved in a classroom or laboratory activity.

Program Title: Industrial Processes Control and Automation

San Jose State College, Industrial Studies Department, San Jose, California

This industrial arts course covers the general area of industrial processes as they relate to automatic manufacturing. The class is divided into the elements of instrumentation, numerical control, automation, and process control covering hydraulics, pneumatics, and electrical.

Laboratory work consists of experiments in temperature, pressure, level and flow, and preparation of engineering reports about these experiments. Students are also involved in designing and building control systems to automate simple machines.

Program Title: Industriology

Wisconsin State University—Platteville, Department of Industrial Education, Platteville, Wisconsin

The industriology concept is not intended to replace industrial arts as a curriculum but rather to supplement, revise, and modify present-day industrial arts programs.

A two-pronged approach to the study of industry has been developed. The first is concerned with the history, development, and implications of industry as a vital institution in modern society. Six basic industrial activities have been identified and selected as areas of study. These six are: (1) design and development; (2) internal finance and office services; (3) manufacturing or processing; (4) marketing; (5) industrial relations; and, (6) purchasing.

The other prong is concerned with the types of industries. Four general types of industries have been selected, and are believed to make up the total industrial complex. These four are the raw materials or extractive industries, the manufacturing industries, the service industries, and the distributive industries.

Four phases have been suggested as a basis for a complete program. Development and Structure of Industry is intended as an overview of all industry for grades seven, eight, or nine. Phase II is centered around Basic Elements and Processes of Industry and includes short modules or topics such as time and motion study, aerospace industries, quality control, and product development. The third phase on Modern Industry is structured somewhat traditionally, according to the specific materials used in the industry, and may involve up to seven full-year courses. The Vocational and Occupational Guidance phase is for grades 11 or 12, aimed at students who will soon enter the world of work.

Instructional materials are being prepared, and two federally funded teacher fellowship programs have been completed in developing the concept.

Program Title: Introduction to Industry

Winona State College, Division of Fine and Applied Arts, Winona, Minnesota

This general education course is designed to present the structure of industry as found in today's society. The students served by this program make up approximately one third of the college freshmen enrollment. Approximately 50 percent of the students enrolled are women. The course is one of three offered in the Bachelor of Arts program—the others being Introduction to Art and Introduction to Music. The class is also one of four courses required for the Bachelor of Arts program. Approximately 500 students were enrolled in 20 sections for the 1968-69 school year.

Introduction to Industry is a two-phase program. The classroom phase consists of presentations, demonstrations, and discussions. The varied background of the students has been a distinct advantage during the discussion and brainstorming sessions. The laboratory phase consists of a mass production experience totaling approximately 20 hours. This involves the selection, designing, planning, and production of a product.

The course content has been based upon the 13 concepts of American industry as developed by Stout State University. The program was initiated by two instructors in 1967 and because of its potential it has been adopted by the Industrial Arts Department as a replacement for the former crafts-oriented requirement.

Program Title: Orchestrated Systems Approach to Industrial Education

Indiana State University, School of Technology, Terre Haute, Indiana

This program utilizes the "tool" systems analysis to reveal program responsibility and instructional content. The orchestrated system educational environment provides the framework for generating synergetic learning experiences for the purpose of understanding how our society produces its goods and services that are important to the building of a good life.

The program is designed to serve on a continuum basis regarding ability, grade, and educational objective. It does not segregate by level such as intermediate and advanced, except by individual objective, nor does it separate the industrial arts from the technical and vocational. The experienced and highly skilled are important to operating the orchestrated systems and the beginners and inexperienced benefit by observing and relating to them. The program is now operating at the college level and has been planned for the secondary school as well.

There are many innovative features in the program, including systems analysis and modeling applied to education, skill and technical knowledge development under self-motivation and self-discipline generated from the orchestrated game-effect, and provision for individualized development even to competence in a variety of technical areas. Also of importance are the concepts of cumulative change designed for understanding the changing technology by helping to create change, learning and experiencing in context, and the challenge for inquiry and creativeness. The program purports to be consistant with curriculum theory that identifies man as essentially a creator.

Program Title: New Concepts for Teacher Training Programs

Southern Illinois University, Division of Technical and Industrial Education, Carbondale, Illinois

The stated purpose of this program is to prepare enterprise teachers who will have a broad understanding of industry, trade, business, commerce, and the public sector. The program serves enterprise majors but not trade and industry or technical teaching majors.

The major concentration consists of three groups of courses. One of these is a twenty-four quarter hour block of selected courses in social and behavioral sciences. These courses are intended to create awareness and lend understanding with regard to many of the problems of organizing, directing, controlling, and evaluating the work of human beings as related to efficient production and the economy.

Eight new lecture-laboratory courses comprise the technical part of the major concentration. There are two courses in each of four areas: Visual Communications, Materials and Processes, Energy Conversion and Power Transmission, and Electronics and Instrumentation.

The course in Visual Communications will treat all forms of two-dimension communications. Some of these are technical sketching and drawing, printing and duplicating, blueprinting and whiteprinting, copying and drawing.

Materials and Processes will involve study of the basic characteristics of woods and paper, plastics and synthetics, metals, ceramics, and perhaps organic materials and some of the processes thereto applied in contemporary industry.

Energy Conversion and Power Transmission will entail study of characteristics and principles of a variety of energy forms and testing of many kinds of engines and

motors. Muscle, solar, chemical, mechanical, and atomic energy sources; reciprocating, turbine, jet, nuclear, rocket and other engines; and mechanical, hydraulic, pneumatic and wave transmission systems will be studied.

Electronics and Instrumentation will consist of a review of electron theory, optics and sound, and other principles of physics.

Two capstone courses in the major provide mass production experiences and the study of industrial organization. Also included in this phase is a study of instructional materials and methods needed to establish courses in technology, man, and enterprise in the common schools.

Program Title: The Partnership Vocational Education Project

Central Michigan University, Department of Industrial Education and Technology, Mount Pleasant, Michigan

In the summer of 1965, certain of Michigan's secondary schools, community colleges, and industries joined forces with Central Michigan University and The Ford Foundation in establishing the Partnership Vocational Education Project. The program is designed to improve the quality of industrial-technical education courses, the quality of instruction, the articulation from one phase of education to another, and the application of knowledge through correlation of industrial-technical subjects with other academic areas.

Partnership high schools are concerned with curriculum development programs starting with the ninth grade "Study of American Industry," to a correlated approach of English, science, mathematics, and industrial technical education in the eleventh and twelfth grades. The same inter-disciplinary approach is used in the community college programs, and transfer to the University is open if the student wishes to earn the bachelor's degree.

An updated University curriculum in industrial technical education provides a five-year program leading to a bachelor's degree. Emphasis is on more internship teaching experience and on-the-job industrial experience. The first two years are devoted to an inter-departmental sequence of general and specialized education and professional education courses. The remaining three years consists of alternating semesters of on-campus and off-campus paid internships, The student interns for two semesters in a selected school and one semester in a partnership industry. In addition, the student spends one ten-week summer full-time internship as both a learner and an employee in a partnership industry.

In addition, the program provides an in-service "crash program" for upgrading teachers through industrial internships, seminars, and consultation services.

In summary, the various curricula at each level are vertically articulated, horizontally correlated, individualized, balanced between specialized and general education, flexible regarding time and space, and a product of a partnership effort.

Program Title: A Study of Industry and Technology

University of Maryland, Industrial Education Department, College Park, Maryland

The Maryland Plan is designed to provide, at the junior high school

level, an industrial arts experience that has relevance to the needs of man in contemporary society. The emphasis of instruction has been changed from that of teaching about things and projects to that of developing people. The program establishes a structure in which the students are encouraged to carry out research and development aspects and learn about instructional content as they solve problems or work toward an understanding of a major area of industry.

The program was designed for grades seven, eight, and nine. A major emphasis is centered on the concept of a greater degree of involvement between the learner and the content of industrial arts.

Students play the roles of research workers and apply the principles of mathematics, science and mechanics in testing, analysis, and experimentation involving tools, materials, processes, and products. They learn how to discover new information as well as learning about materials and processes.

The program has been in successful operation in schools in Maryland and Virginia for approximately 10 years. Since a 1966 NDEA institute was concerned with the program, it has spread to a number of other states in all sections of the country.

Program Title: VICOED (Visual Communication Education)

Western Washington State College, Department of Technology, Bellingham, Washington

VICOED was developed for the purpose of meeting the challenge of the information explosion and technological revolution that has occurred in the communications field. It is an extension and expansion of graphic arts education to include many other disciplines that affect the visual communication process. This new curriculum was developed with the aid of a $490,000 grant from The Ford Foundation.

The college, in cooperation with several pilot schools and the International Graphic Arts Education Association, originally designed programs to satisfy several student needs. First, came a two-year preoccupational program for students in grades 11 or 12 who either intended to continue their formal education or enter industry after high school. Second, a two-year technology curriculum was designed for the college or community college. Third, an interdisciplinary teacher education program was developed for those who plan to teach at the high school level. Since the completion of the three-year pilot project, a four-year degree program has also been initiated.

To broaden the original graphic arts program this new approach calls for the involvement of psychology, sociology, anthropology, economics and business, speech, journalism, art, chemistry, physics, mathematics, electronics, industrial graphics, photography, and graphic arts.

Student reaction to the new approach has been enthusiastic. High school programs have attracted the more academically competent students, both male and female, as emphasis is placed upon creative work in communication rather than production. The college program has attracted students from the areas of art, economics and business, and English (journalism) as well as those from technology who had already indicated a preference in the area of graphic arts.

Methodology

Program Title: Effective Utilization of Audio-visual Materials

University of North Dakota, Department of Industrial Arts, Grand Forks, North Dakota

Two years of concerted effort by the staff and students in the Department of Industrial Arts have resulted in the design and construction of a semi-automated audio-visual classroom and a study laboratory. Emphasis of the project was on the development of facilities that would encourage greater use of instructional media by teachers and students at all levels of education.

The heart of the classroom is the teacher's console which contains an opaque projector, an overhead projector, a tape recorder, a record player, light controls, an FM receiver, and an amplifier. The console also includes remote controls for operation of film, filmstrip, and slide projectors which are viewed on a rear projector screen located at the front of the room.

Exploded detail monitoring of demonstrations is accomplished through a closed-circuit television system within the classroom. Time-consuming demonstrations may be video-taped so that students can view the entire sequence during one lecture period. Remote lectures and demonstrations are made possible by closed circuit television and an amplified telephone system. Commercial radio and television are also available within the classroom.

The individual and small group media laboratory enables students to utilize films, audio tapes, records, filmstrips, slides, and video-tapes in the individual instruction carrels.

Each carrel contains a permanently mounted screen, study lamp, 110V outlet, bookshelf, earphones, and a control panel containing a telephone jack, closed circuit television outlet, audio input jack and two channels that allow students in any booth to listen to audio media being played over a particular channel.

The facilities are particularly adaptable for modular schedule, team teaching, and other innovative trends in scheduling.

Program Title: Learner Controlled Education

Colorado State College, Department of Industrial Arts, Greeley, Colorado

This twelve-week pilot program has been developed to experiment with the possibility of making students more responsible for the learning process. It is a self-instructional, multi-media approach to teaching that allows the student to proceed at his own pace and to develop his objectives as he proceeds through the program.

At Colorado State, the learner controlled system of instruction for electricity-electronics does not require any new types of materials or any radical curriculum changes. It is merely a better utilization of materials already used by teachers with a move away from the traditional teacher-lecture method.

At the beginning of the course, the student is instructed on the procedures of the course, the general outcomes of the course, and equipment to be used. The student will then select the media he wishes to use in achieving the goals. The instructional materials are in the form of nine basic media: programmed texts and machines, reference books, slides, tapes, workbooks, films and video tapes, overhead transparencies, electrical-electronic equipment, and lecture-demonstration by the students and/or teacher.

Information regarding the personality characteristics and aptitudes of each student is obtained by administering the General Aptitude Test Battery and the Edwards Personal Preference Scale. Information and scores from these two tests will allow the researcher to study the characteristics of the students who are successful in the program. It will also allow identification of people who have difficulty with individualized instruction. A multiple-regression technique will allow the identification of factors that may be used for predicting success or failure of students in the learner controlled education system.

Evaluation of student progress is done individually over small blocks. When the student believes he has attained the outcomes or objectives of a given block, he will ask for an evaluation. Immediate feedback will inform the student whether he must seek additional information or progress to the next unit.

Final grades are determined by a comprehensive objective examination covering the informational phase of the course and a performance examination covering the manipulative phase.

Films for this experiment were provided by the Air Training Command of the U.S. Air Force through Lowry Air Force Base and other media were developed on the local level.

Program Title: Systems Approach (Single Concept Film)

Washington State University, Department of Education, Pullman, Washington

The term *system* as used in this project refers to the efforts made to develop, field test, and revise instructional materials. This university has assisted the Anatone, Washington school district in developing the systems for a project named *High School for One,* which is similar to the Mary Walker High School project described on page 6.

The material developed is intended to provide curricular offerings to small school districts where qualified teachers are not available.

The industrial arts subjects have been individually programmed through multi-media techniques that enable students to pursue new areas previously unavailable.

Teacher Preparation

Program Title: Education Projects in Industrial Arts

University of Northern Iowa, Department of Industrial Arts and Technology, Cedar Falls, Iowa

This is a graduate course in industrial arts open only to students who have some background in the major activity being studied. The background may consist of formal instruction in school; experience in teaching, military, employment; or with a hobby. The course is considered as one emphasizing enrichment and expansion into *new areas* of instruction. An appropriate topic is important.

Each student is required to select and complete one comprehensive educational project during the course. Included in the investigation is a thorough study on such topics as historical background; geographical, occupational, and technical information; and, the usual topics of tools, machines, materials, and methods of industry. The study requires the extensive use of library materials, trips to industries, and correspondence with industrial concerns in other geographical areas. The project culminates in a report to the class and the preparation of a term paper and also an abstract manuscript, with photographs, suitable for magazine publication. It is the student's responsibility to submit his article to a magazine of his choice for publication.

The independent study technique allows each student to develop techniques for problem solving, and affords him the opportunity to acquire new and meaningful manipulative skills and relevant information on industrial activity. The original research permits the student to analyze and organize the skill and information for instructional and counseling purposes.

Program Title: LaConner Pilot Project

Western Washington State College, Department of Technology, Bellingham, Washington

A cooperative project between this University and the LaConner High School in Washington has been developed to aid both graduate students and the small school districts. The school district pledged to hire a graduate student on a half-time basis. The pledged flexible scheduling and financial support would enable the student to attend classes at the college campus and at the same time develop an exemplary comprehensive general shop program for the school.

The college pledged to assist in the selection of an outstanding teacher candidate and agreed to make necessary concessions in the graduate program so all course work was relevant to the needs and problems of the teaching situation in a small rural high school. The faculty of the college has provided assistance through course work assignments and actual visitations. The Department of Technology has loaned certain items so that new areas can be incorporated into the general shop setting.

The experiment has been well received and plans are being made for expansion both in this district and in surrounding districts.

Program Title: Student Study in Industry

State University College at Buffalo, Applied Science and Technology, Buffalo, New York

The *student study in industry* program has been established to test the feasibility of industrial internship as a means of improving industrial arts teacher education. The industrial arts movement toward an understanding of technology rather than an arts and crafts or pseudo vocational-type activity has placed new demands on teachers that cannot always be fulfilled by conventional college courses.

In this program, college seniors, who have already demonstrated proficiency during their student-teaching experience, are rotated through various departments of production and management in industry. The college and industry work cooperatively to develop a program that provides firsthand experience in the actual mechanics of industry. This directed technique has proved

to be an effective and manageable technique in identifying the important concepts of industry, and in enabling future teachers to more effectively select content and determine appropriate methodology.

Program Title: Teacher Certification Option in Industrial Arts

Ohio University, Department of Industrial Technology, Athens, Ohio

The major purpose of the teacher certification option is to permit reconsideration of the decision regarding the professional careers choice between teaching and industrial employment. The program provides an avenue by which individuals in technology can prepare for a teaching career.

The innovative feature of this program is to utilize a block of restricted elective courses scheduled for the final year as background in education theory and in practice teaching. A period of two weeks is spent observing and assisting in a high school during the fall opening session. Education courses comprise approximately half the student load during the fall and winter quarters. In the final quarter, the entire term is spent in a practice-teaching situation.

A faculty supervisor has been appointed to coordinate both the student-teaching and the cooperative work-study program for technology students. The direct goal of the program is to produce better qualified teachers by providing increased background in science, mathematics, computer programming, economics, and business courses, in addition to the background in shop activities.

Program Title: Variable Credit Teacher Education Program

University of Idaho, Industrial Education Department, Moscow, Idaho

The variable credit major recently implemented at the University of Idaho was established after a study of: (1) the placement and teaching responsibilities of graduates with a major in industrial arts, (2) the placement needs of both large and small school districts, and (3) the professional objectives, as well as technical aptitudes and interests, of prospective graduates majoring in industrial arts education. Because the results of the study showed that the existing 40-credit major was not fulfilling the professional or technical needs of the teachers being prepared, a two-level major was established.

The 45-credit major is tailored primarily to prepare instructors for teaching a broad exploratory shop program generally offered at the junior high school level, as well as for the small comprehensive senior high program found in school districts providing a general shop approach and a one-man instructional staff. The program provides preparation in breadth covering a multiplicity of technical shop areas normally associated with the secondary school curriculum.

The 60-credit major is designed to prepare subject specialists for the large comprehensive and technical high school. Students are provided the opportunity to secure depth of preparation in one or more technical areas commensurate with their aptitudes and interests.

In-service Education

Program Title: Closed Circuit TV In-service Education

Board of Education of the City of New York, Industrial Arts Department, Brooklyn, New York

In anticipation of the future widespread use of portable closed circuit television and video tape recording systems in teaching, this in-service program provides training in the use and advantages of such equipment. In addition to mechanical use of the portable television unit, instruction is also given in the areas of programming, lesson planning, lighting, timing, sound dubbing and splicing. Instruction is included on the use of the portable battery-pak camera and recorder. This videocorder is taken to industrial plants to record technical advances in industry.

Fifteen weekly two-hour sessions are required to complete the in-service program. Portable equipment and video tapes are loaned to the school district by the Sony Corporation of America.

Program Title: In-service Credit for Industrial Arts Teachers

St. Paul Public Schools, District #625, Industrial Arts Department, St. Paul, Minnesota

Teachers in St. Paul may earn up to six credits toward salary schedule placement by attending evening classes at the local Vocational-Technical Institute. The program offers an opportunity for secondary school teachers to upgrade their skills, increase technical knowledge, become more current with industrial practices, and acquire competencies to broaden existing programs or change fields.

Approximately 25 clock hours of shop work are required for one in-service credit, but flexibility is permitted depending upon the nature of the course. Teachers are not required to take the regularly prescribed apprenticeship or trade extension classes, and may work out an individualized program based on actual needs.

Many teachers have availed themselves of the opportunity to participate in this program. In some cases, teachers have accumulated more in-service hours than may be used toward the salary placement, and the six-credit hour maximum is now being raised. It has been found that inexperienced teachers need this extra training to be successful in senior high unit shops.

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Appendix

List of program titles, schools, agencies or areas involved, and person reporting. Listed in same order as projects appear in booklet.

Aircraft Design and Construction
School: Cabool High School, Cabool. Missouri 65445
Person Reporting: William Ghan, Industrial Arts Instructor
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Audio-visuals in Industrial Arts
School: Medicine Hat High School #76, 345 - 11 Street, S.E., Medicine Hat, Alberta, Canada
Person Reporting: R. E. Ginn, Industrial Arts Instructor
Page 6

High School Project for One
School: Mary Walker School District, Springdale, Washington 99173
Person Reporting: Walter Lindman, Superintendent
Page 6

Individualized Instruction in Industrial Arts Electronics
School: Oberon Junior High School, 7300 Quail Street, Arvada, Colorado 80002
Person Reporting: Dick Lightner, Instructor
Page 7

Individualized Programming of Industrial Arts Content
School: Nova High School, 3600 S.W. 70th Street, Fort Lauderdale, Florida 33314
Person Reporting: Alfred V. Rapp, Technical Science Chairman
Page 7

West Carrollton Blocktime Plan
School: West Carrollton Senior High School, 5833 Student Street, West Carrollton, Ohio 45449
Persons Reporting: Don F. Gier and Robert B. Hail, Industrial Arts Instructors
Page 7

Corporation Experience
School: Serramonte High School, 131 Westmoor Avenue, Daly City, California 94015

Person Reporting: Gerald R. Maxwell, Industrial Arts Department Chairman
Page 8

Manufacturing
School: Evanston Township High School, 1600 Dodge Avenue, Evanston, Illinois 60204
Person Reporting: William L. Clanton, Industrial Arts Supervisor
Page 8

Mass Production for the Individual Product
School: Roosevelt Junior High School, 14th and Broadway, Pittsburg, Kansas 66762
Person Reporting: Max Lundquest
Page 9

A Study of Manufacturing Industries
School: Shiloh Junior High School, 2203 Grantwood, Parma, Ohio 44134
Person Reporting: Richard Barella, Industrial Arts Instructor
Page 9

Understanding Industry Through Mass Production
School: Dayton City School District, 408 Sandalwood Drive, Dayton, Ohio 45406
Person Reporting: Gene Woolery, Industrial Arts Instructor
Page 9

In-line Production Experiments
School: Orchard Hill Junior High School, 88 Bassett Road, North Haven, Connecticut 06473
Persons Reporting: Frank Lesieur, Industrial Arts Department Chairman, Instructor, Metals Area; James Dowers, Instructor, Woods Area
Page 10

Mass Production Unit
School: Hardin Junior High School, St. Charles, Missouri 63303
Person Reporting: Dal Jones, Industrial Arts Instructor
Page 10

Team Teaching of Mass Production
School: Greenville Junior High School, Greenville, Tennessee 37743
Person Reporting: Roger T. Brown, Industrial Arts Department Chairman
Page 10

Manufacturing in Industrial Arts
School: Illinois State Normal University High School, University Street, Normal, Illinois 61761
Person Reporting: Ronald Lutz, Industrial Arts Department Chairman
Page 10

Materials Fabrication and Testing
School: Plantation Senior High School, 6901 N.W. 16th Street, Fort Lauderdale, Florida 33313
Person Reporting: James Yadon, Industrial Arts Department Chairman
Page 10

Industrial Occupations
School: The Board of Public Instruction, County of Polk, Bartow, Florida 33830
Person Reporting: Troy Cummings, Coordinator of Industrial Arts
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Career Guidance Program
School: Board of Education of the City of New York, 131 Livingston Street, Brooklyn, New York 11201
Person Reporting: Arlen DeVito, Supervisor
Page 11

Family Living in an Urban Society
School: Board of Education of the City of New York, 131 Livingston Street, Brooklyn, New York 11201
Person Reporting: Robin W. Kazer, Assistant Director of Industrial Arts
Page 12

Ford Foundation Correlated and Pre-technical Programs
School: Board of Education of the City of New York, Office of Curriculum, 480 Pacific Street, Brooklyn, New York 11217
Persons Reporting: Isaac Hersh and Abraham B. Pollack
Page 12

Home and Community Practical Work Experience Program
School: Board of Education of the City of New York, 131 Livingston Street, Brooklyn, New York 11201
Person Reporting: Eugene Haug, Supervisor of Industrial Arts
Page 12

Motivating Disadvantaged Students
School: Wichita Public Schools, AVTS — Central Building, 324 North Emporia, Wichita, Kansas 67202
Person Reporting: Carl C. Bruner, Director of Industrial Arts
Page 13

Pre-tech Program of Interdisciplinary Instruction
School: San Lorenzo Valley Unified School District, P.O. Box 488, Felton, California 95018
Person Reporting: Dorothea Jennings, Program Coordinator
Page 13

Pre-work Program
School: Jefferson Junior High School, R.D. #7, Columbia, Missouri 65201
Person Reporting: F. Milton Miller, Supervisor of Industrial Arts
Page 13

Summer Production Woodworking Project for Constructing Teaching Aids
School: South Junior High School, 406 North Weber Street, Colorado Springs, Colorado 80902
Person Reporting: Stephen Mindock, Industrial Education Supervisor
Page 14

The Anthropological Unit Approach to Industrial Arts
School: Earle B. Wood Junior High School, Bauer Drive, Rockville, Maryland 20853
Person Reporting: George M. Haney, Industrial Arts Instructor
School: Jefferson County School District, 3900 Kipling Street, Wheat Ridge, Colorado 80033
Person Reporting: Les Litherland, Industrial Arts Instructor
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Contemporary Units of Study
School: Roosevelt Junior High School, 1171 Lee Road, Cleveland Heights, Ohio 44118
Person Reporting: Lorin V. Waitkus, Instructor
Page 15

Research and Experimentation in Industrial Arts
School: Montgomery Hills Junior High School, 1000 Woodside Parkway, Silver Spring, Maryland 20910
Person Reporting: Alan Keeny, Instructor
Page 15

The Middle School Industrial Arts Program
School: MacDonald Middle School, 1601 Burcham Drive, East Lansing, Michigan 48823
Person Reporting: J. Sevande, Industrial Arts Instructor
Page 15

A New Industrial Arts
School: Warrensville City School District, 4270 Northfield Road, Warrensville Heights, Ohio 44128
Person Reporting: E. Allan Bame, Industrial Arts Coordinator
Page 16

Industrial Education 23
School: Unified School District No. 1, 2230 Northwestern Avenue, Racine, Wisconsin 53404
Person Reporting: K. L. Schank, Consultant in Practical Arts
Page 16

Industrial Arts Curriculum Project (Pilot)
School: Cincinnati City Schools, 230 East Ninth Street, Cincinnati, Ohio 45202
Person Reporting: Jack Ford, Supervisor
Page 17

Industrial Arts for the Handicapped
School: Edmonton Public School Board No. 7, 8744 Eighty-Ninth Avenue, Edmonton, Alberta, Canada
Person Reporting: J. A. Desrosiers, Industrial Arts Instructor
Page 18

Industrial Arts for Mental Retardates
School: Board of Education of the City of New York, 131 Livingston Street, Brooklyn, New York 11201
Person Reporting: Eugene Haug, Supervisor of Industrial Arts
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American Industry Project
School: Stout State University, Menomonie, Wisconsin 54241
Person Reporting: Wesley L. Face, Co-director
Page 21

Development of a Common Body of Knowledge for a Study of Technology in a Systems Approach of Industry
School: Eastern Illinois University, School of Industrial Arts and Technology, Charleston, Illinois 61920
Person Reporting: Dean Teel, Associate Professor
Page 21

Functions of Industry
School: Wayne State University, Department of Industrial Education, Detroit, Michigan 48202
Person Reporting: Willard M. Bateson, Professor
Page 21

The Georgia Plan for Industrial Arts
School: Georgia Southern, Industrial Technology Division, Statesboro, Georgia 30458
Person Reporting: Donald F. Hackett, Chairman
Page 22

The Industrial Arts Curriculum Project (IACP)
School: The Ohio State University, Academic Faculty of Industrial Technology, 1712 Neil Avenue, Oxley Hall, Columbus, Ohio 43210
Person Reporting: James J. Buffer, Assistant Director (Evaluation)
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Industrial Arts Technology: A Study of American Industry
School: Gorham State College of the University of Maine, Department of Industrial Education and Technology, Gorham, Maine 04038
Person Reporting: John Mitchell, Chairman
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Industrial Materials
School: San Jose State College, Industrial Arts Department, 125 South 7th Street, San Jose, California 95114
Person Reporting: Louie Melo, Professor
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Industrial Processes Control and Automation
School: San Jose State College, Industrial Studies Department, San Jose, California 95114
Person Reporting: J. W. Chaplin, Professor
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Industriology
School: Wisconsin State University —Platteville, Department of Industrial Education, Platteville, Wisconsin 53818
Person Reporting: Jack Kirby, Head
Page 24

Introduction to Industry
School: Winona State College, Division of Fine and Applied Arts, Winona, Minnesota 55987
Person Reporting: Gerald W. Tobin, Instructor
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Orchestrated Systems Approach to Industrial Education
School: Indiana State University, School of Technology, Terre Haute, Indiana 47809
Person Reporting: L. W. Yoho, Dean
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New Concepts for Teacher Training Programs
School: Southern Illinois University, Division of Technical and Industrial Education, Carbondale, Illinois 62901
Person Reporting: Ronald Stadt, Chairman
Page 25

The Partnership Vocational Education Project
School: Central Michigan University, Department of Industrial Education and Technology, Mount Pleasant, Michigan 48858
Person Reporting: Ernest L. Minelli, Project Director
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A Study of Industry and Technology
School: University of Maryland, Industrial Education Department, J.

M. Patterson Building, College Park. Maryland 20740
Person Reporting: Donald Maley. Chairman
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VICOED (Visual Communication Education)
School: Western Washington State College, Department of Technology, High Street, Bellingham, Washington 98225
Person Reporting: Ray A. Schwalm. Project Director
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Effective Utilization of Audio-visual Materials
School: University of North Dakota, Department of Industrial Arts, Grand Forks, North Dakota 58201
Person Reporting: A. E. Rudisill, Chairman
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Learner Controlled Education
School: Colorado State College, Department of Industrial Arts, Greeley, Colorado 80631
Person Reporting: David L. Jelden, Chairman
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Systems Approach (Single Concept Film)
School: Washington State University, Department of Education, Pullman, Washington 99163
Person Reporting: Arnold M. Gallegos, Professor
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Education Projects in Industrial Arts
School: University of Northern Iowa, Department of Industrial Arts and Technology, Cedar Falls, Iowa 50613
Person Reporting: Howard O. Reed, Department Head
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LaConner Pilot Project
School: Western Washington State College, Department of Technology, High Street, Bellingham, Washington 98225
Person Reporting: Sam R. Porter, Chairman
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Student Study in Industry
School: State University College at Buffalo, Applied Science and Technology, Buffalo, New York 14222
Person Reporting: Alfred T. Capen, Associate Professor
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Teacher Certification Option in Industrial Arts
School: Ohio University, Department of Industrial Technology, Athens, Ohio 45701
Person Reporting: Donald E. Perry, Chairman
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Variable Credit Teacher Education Program
School: University of Idaho, Industrial Education Department, Moscow, Idaho 83843
Person Reporting: William R. Biggam, Chairman
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Closed Circuit TV In-service Education
School: Board of Education of the City of New York, 131 Livingston Street, Brooklyn, New York 11201
Person Reporting: Donald Pitkoff, Curriculum Coordinator
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In-service Credit for Industrial Arts Teachers
School: St. Paul Public Schools, District #625, Industrial Arts Department, 716 City Hall, St. Paul, Minnesota 55102
Person Reporting: Claudius W. Wilken, Supervisor
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